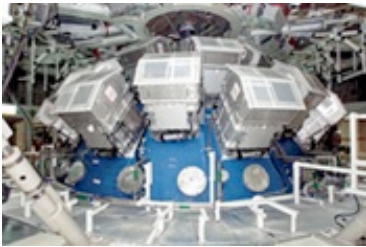


LAWRENCE LIVERMORE

REPORT

A weekly collection of scientific and technological achievements from Lawrence Livermore National Laboratory: Feb. 25-29, 2008.

Snapshots offer a look into achieving fusion



When completed in 2009, scientists will use the National Ignition Facility to achieve fusion.

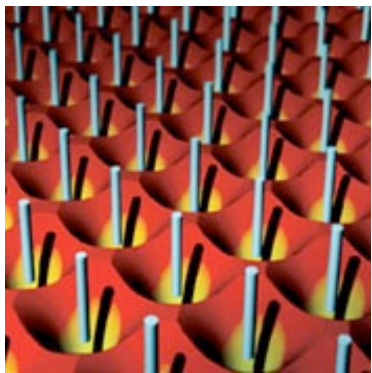
A team of physicists from Lawrence Livermore National Laboratory, Massachusetts Institute of Technology and the University of Rochester have devised a new way to take "snapshots" of the high-energy, high-temperature reactions seen as key to achieving the long-held dream of controlled nuclear fusion. The work, which is reported in the Feb. 28 issue of *Science*, could one day help scientists harness nuclear fusion as an energy source. It could also shed light on basic questions about the physics of stars.

Achieving controlled nuclear fusion, which could be a safe and reliable source of nearly limitless energy, is one of the "holy grails" of high-energy-density physics. For decades, scientists have been working toward that goal by setting off miniature implosions that recreate the high temperatures and densities found in stars.

Lead author of the *Science* paper is LLNL physicist Ryan Rygg, formerly an MIT Physics Department graduate student and a recent Ph.D recipient at MIT's Plasma Science and Fusion Center (PSFC).

For more on the team's efforts, see <<http://web.mit.edu/newsoffice/2008/fusion-0228.html>>
<http://web.mit.edu/newsoffice/2008/fusion-0228.html> . For the science article, see
<http://www.sciencemag.org/cgi/content/full/319/5867/1223>

Nano-tweezers may pluck production time



An artist's depiction of an array of vertical nanowires.

Smaller-scale technology can lead to big rewards, but working with it can be tricky if not time consuming. When it comes to working with nanowires, a Lab researcher has helped to find a way to speed things up.

New research from Livermore scientist Peter Pauzauskie, as well as colleagues from UC Berkeley, UCLA and Lawrence Berkeley National Lab, shows that individual semiconducting and metallic nanowires—think of a wire whose diameter is equal to one billionth of a meter—can be manipulated and separated using optoelectronic “tweezers.” These tweezers use 100,000 times less power density than optical tweezers, and are able to manipulate individual nanowires four times faster than previously used methods.

The research, reported in the cover story of *Nature Photonics*, has important applications in solar energy conversion, thermoelectric cooling and transistors. For more on the story see https://newsline.llnl.gov/articles/2008/feb/02.29.08_nanowire.php

Forensic science team dives into chemical agent detection



A close-up of the "electronic nose" device under development.

Lab scientists are creating a compact, low-power unit capable of detecting vapor from nerve and blister agents such as VX gas and sulfur mustard. The device sports what Lab scientists Brad Hart and Tom Ratto liken to little silicon “diving boards.” Each of these boards, or microcantilevers, has a chemically selective coating. When the polymer coating on top absorbs vapor, the surface swells and bends the cantilever. The pattern of deflection across the array indicates a unique chemical signature. This research, which has applications in homeland security, will appear in *The Analyst* in March.

For more, see https://newsline.llnl.gov/articles/2008/feb/02.29.08_sensor.php

Lawrence Livermore doing its part to reduce energy consumption

The grades are in, and they show the desired trend -- down, for energy consumption. The Lab's energy usage dropped by 4.2 percent in the first quarter of fiscal year 2008. At the top of the class are steps such as resetting the temperature point in Laboratory chillers. This measure, along with adjustments to heating and cooling, is expected to save an estimated \$866,000 annually.

The push to cut back on energy use is part of an overall effort by the Department of Energy complex. As a result efforts are being undertaken institutionally as well as individually.

At LLNL, employees have contributed their share by remembering such simple measures as shutting off lights if they will be out of their offices for 10 minutes. Taken together, these measures are a good first step in the Lab's efforts to reduce energy consumption by at least 9 percent by October.

Hydrogen-powered ride for New Zealand ambassador



New Zealand Ambassador Roy Ferguson (front seat) and Counsel-General Rob Taylor (rear seat) get a ride in the Lab's hydrogen-powered car driven by LLNL's Tim Ross.

New Zealand Ambassador Roy Ferguson and Counsel-General Rob Taylor visited the Laboratory Tuesday and were able to tour the facilities, and ride in the Lab's hydrogen-powered car. The two came to the Lab to discuss climate change, energy and take tours of the National Atmospheric Advisory Center and the National Ignition Facility.

Ferguson and Taylor also discussed their country's own efforts to respond to global warming, including: implementation of an emissions trading system; release of the New Zealand Energy Strategy; a program for establishing a carbon-neutral public sector; biofuels transport obligations to improve vehicle emissions standards; and increased investment in climate change science and research.

LLNL is managed by Lawrence Livermore National Security, LLC, for the U.S. Department of Energy's National Nuclear Security Administration.

LLNL applies and advances science and technology to help ensure national security and global stability. Through multi-disciplinary research and development, with particular expertise in high-energy-density physics, laser science, high-performance computing and science/engineering at the nanometer/subpicosecond scale, LLNL innovations improve security, meet energy and environmental needs and strengthen U.S. economic competitiveness. The Laboratory also partners with other research institutions, universities and industry to bring the full weight of the nation's science and technology community to bear on solving problems of national importance.

To send input to the Livermore Lab Report, send e-mail <mailto:labreport@llnl.gov>.

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